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PROSPECTS FOR THE DEVELOPMENT OF FISHERY IN THE INDIAN OCEAN

by
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The Indian Ocean is almost one and a half times less than the Atlantic Ocean and two and a half times less than the Pacific Ocean. The fish yield in the Indian Ocean for 1960 amounted to about 2 million tons in comparison with 14.9 in the Atlantic and 16.4 in the Pacific Oceans. Hence, the yield of fish per 1 sq.km. of water surface in the Indian Ocean is less than 30 kg. in comparison with the 91 and 140 kg. for the Pacific and the Atlantic Oceans respectively. The amount of fish caught in the Indian Ocean per area unit in the zone of the continental shelf is equally inappropriate: in the latter area the figure is one and a half times less than in the Atlantic and over twice as less as in the Pacific Ocean.

However, the area used for fishery in the Indian Ocean is almost entirely situated within the limits of the tropical waters extending from 30°N down to 35°S and, hence, it would be more expedient to compare the fish catch in the Indian Ocean with the yield in the tropical part of the other oceans. This kind of approach introduces a radical change in the whole picture. The fish catch per area unit in the Indian Ocean is only somewhat less than in the respective tropical part of the Pacific Ocean and is considerably greater than in the Atlantic Ocean. These ratios seem to come closer to the actual situation.

The seasonal upwellings of the abyssal waters caused by the monsoons make up the characteristic features of the waters in the Indian Ocean. The latter reveal a well pronounced subsurface layer with a minimum of oxygen content, a complex system of currents predetermined by a wide interaction of strongly heated tropical and cold subarctic waters and also a complex contour of the ocean's coastline. The area of the shelf is relatively small.

There are no distinguished differences between the quantitative indices of the benthos and the plankton in the tropical portions of the Indian and Pacific Oceans.

The ichthyofauna of commercial significance in the Indian Ocean reveals a complex composition which is in general characteristic for the biogeographical fishery complexes of the tropical region and reflects the multiformity of the ecological groups. The two main complexes/the coastal and oceanic complexes/ are subdivided into several ecological groups of species. Within the coastal complex one can note the pelagic, the bottom and the anadromous group of fishes. Among the pelagic fishes it is possible to distinguish the plankton-eaters and the predatory species, and among the bottom species the benthos-feeders and the predatory ones. Within the oceanic complex there are plankton-eaters and predatory fishes. Owing to the fact that the species composition of the fish yields taken from various regions of the Indian Ocean area is not covered satisfactorily by the landing records one can estimate by species merely about 60-65% of the total fish yield produced by the Indian Ocean area i.e. only 1.25 million tons of the total yield of 2 million tons.

The commercial fishery in the Indian Ocean is based mainly on the yield of the fishes belonging to the coastal complex, which produce 4/5 of the entire fish catch. The major role among this set of fishes belongs to the coastal /shelf/ pelagic plankton-eaters which comprise half of the fish stock under account /650 thousand of the 1250 thousand tons/ and are followed by the bottom predatory fish species /160 thousand tons/. The coastal-pelagic predatory species, the coastal benthoseaters and the laggon-and-estuary fishes produce yields of 80-90 thousand tons each. The anadromous fish group gives the least amount, which is somewhat over 5 thousand tons. The oceanic predatory species /mainly tuna produce yields of about 160 thousand and the oceanic plankton-eaters a catch of about 10 thousand tons. Thus, the share of the coastal fishery is the greatest in the total fish yield, exceeding

1000 thousand tons from catch known by species which amounts to 1250 million tons. Only a small portion of this yield is taken by the poorly developed trawl fisheries. The bulk is, possibly, over 9/10, produced close inshore in the immediate vicinity of the coastline or at a viewshot from the shore by means of beach seines, trap nets, set gill nets, cast nets and hook-and-line fishing gears. These methods strongly differ from the fishery technique used in the Atlantic and Pacific Oceans. In the latters the portion of the fish yield brought in from the areas in the open sea is much greater.

The composition and the role of the enumerated ecological groups for the development of the fishery activities in different areas of the Indian Ocean differ from each other. The five main areas of fishery are to distinguish within the Indian Ocean: four coastal ones:- the South African, the Eastern African, the Asiatic /to be more precise, the Asiatic- North Australian/, the Australian proper; besides the last one, the oceanic proper. The East African and the Asiatic coastal areas as well as the oceanic area of the Indian Ocean are situated within the boundaries of the tropical waters and contain the ichthyofauna of the tropical complex contrary to the South African and the Western Australian areas influenced by the temperate waters of the southern hemisphere and populated by the ichthyofauna of the notal /antiboreal/ complexes.

The East African and Asiatic areas strongly differ according to the character of their continental shelf /0-200m./.

The composition of the coastal /shelf/ ecological groups of fishes in the Western and Northern portions of the Indian Ocean coasts differ from each other.

Contrary to the coastal /shelf/ ecological groups the oceanic group proper /the oceanic complex/ seems to appear as an single unit for the whole Indian Ocean.

The investigations of Soviet complex oceanographic expeditions aboard R/V"Vityaz" in 1959-1960 show how great the feeding grounds for the thriving of fish are. There are ample plankton and benthos biomass /in the shelf zone/ and great shoals of pelagic fish /tuna, Coryphaena, etc./ in the open sea. The fact that in many areas there are upwelling of abyssal waters enriched with biogenic elements provides for the high plankton content of its waters and, hence, creates conditions for the development of fishes. The r ise of the thermocline layer conditioned by intense heating leads to an increse of the plankton concentration in the nearsurface layer and, hence, stimulates the density of the fish stock which is so important for commercial fisheries.

During the cruises of R/V"Vityaz" it was established that in some areas there are great numbers of larvae of tuna, marline and swordfish and that the mentioned species enjoy wide distribution.

The complexity of the water mass structure in the Indian Ocean is favourable for the formation and the concentration of pelagic fish stocks in many areas of the ocean /tuna, Coryphaena, marlines etc./.

It seems that the fisheries in the shelf zone can be increased by means of shifting the basic zone of commercial fishing from the coastline to the shelf slope boundary; in these sites one can expect the enrich ment of productivity in the boundary zone between the rising abyssal waters and the shelf waters proper.

There is a possibility for a further increase of commercial fisheries in the boundary areas between the upwelling abyssal waters and the surface waters predetermined by the monsoons. And lastly, considerable amounts of fish can be expected in the boundary areas of the qualitatively different water masses along the latitudinal fronts of the tropical and equatorial convergence, in the convergence zones of the Somalian and Australian currents with the equatorial waters, along the southern boundary of the south-equatorial and northern boundary of the northequatorial currents.

A realistic program for the expansion of the fishing areas in the Indian Ocean should be based on a complex wide range investigation of the basin's biological productivity covering an interconnected exploration of the entire series of biological chains beginning from the biogenic elements up to fishes.

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